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MARCH, 1936

PROTECTION OF ANIMALS IN NORWAY.

IN the February issue we gave the principal regulations which set forth what the Government of Norway forbids on grounds of cruelty, and amongst the clauses there are several which deal with operations upon animals.

Two especial points strike the veterinarian when glancing at the regulations for the first time.

One is that "a qualified veterinary surgeon, police official or member of the Animals' Protection Committee shall at any time be permitted to inspect the stable or place where the animal is kept." The second, to which the attention of our readers will be especially welcome, is that "any treatment or operation upon an animal involving appreciable suffering shall only be carried out by a qualified veterinary surgeon." Again: "Only a qualified veterinary surgeon shall be allowed to castrate horses." This also applies to cattle and pigs over three months old and adult sheep or goats. For all painful major operations some anæsthetic, either general or local (so long as it is satisfactory in its action) must be used, except when inadvisable for medical reasons.

Again, no horse certified as over twenty years old shall, without the permission of the Animals' Protection Committee, be sold for any purpose other than slaughter; this, too, shall apply to horses which, through illness or bad habits, are unfitted for further use.

Docking horses' tails and the use of live bait for fish are equally forbidden—as in Great Britain!* The complete items of the Bill are well worth perusal for comparison with what is done in this country; and the Norwegians are to be congratulated upon taking so important a step forward in this matter.

* It is to be hoped that the law is more effectively administered in Norway than in England.—EDITOR.

General Articles

FOOTNER ELECTRIC COLLAR FOR THE HUMANE SLAUGHTER OF ANIMALS.

By S. T. AMOS, F.R.C.V.S.
Durban.

For a number of years past very interesting work in Durban has been going on in connection with the electrocution of animals, especially oxen, to replace the ordinary methods of slaughter, at one of our biggest abattoirs. The work has been done by Mr. W. E. Footner, M.R.C.V.S., Government Veterinary Officer at Durban, in collaboration with Mr. E. R. Wadsworth, the electrical engineer of the meat firm owning the abattoir, and, personally, I have kept myself very closely in touch with the results of their work and have witnessed many demonstrations of the actual killing of oxen.

It is my considered opinion that the results justify the use of this method of destruction wherever possible, because I feel that it is one of the greatest steps in humanity to animals that I have ever witnessed, and on account of those convictions I have no hesitation in advising all municipalities who govern abattoirs, and private proprietors of abattoirs, to do their utmost to install this method of destruction.

Experiments have been conducted with electricity in order to produce anæsthesia in animals and man for many years past, most of this work having been performed in Germany, France, Holland and the United States of America. All such experiments with regard to the use of electricity in connection with the destruction of animals have aimed at producing insensibility prior to slaughter, and the electrolethaler has been evolved, which is being used for the painless destruction of sheep and pigs in many countries with every success. Efforts to obtain similar results in connection with the slaughter of cattle, however, have not been attended with the same satisfactory results, until, as a result of a long series of experiments conducted at Maydon Wharf Export Abattoirs, Durban, by Mr. W. E. Footner, M.R.C.V.S., with the co-operation of Mr. E. R. Wadsworth, A.M.I.Mech.E., the Footner Electric Collar was perfected. This method differs from any of those previously referred to in the following more important points :

(*a*) *The Site of Application.*—The best results have been obtained by applying the current in or as near as possible to the jugular furrow at the upper extremity of the neck. There is every reason to believe that the application of "electricity" of the strength used, namely, 160 volts A.C., to the site indicated will cause instantaneous unconsciousness as a result of intense muscular contraction, combined with contraction of the muscular walls of the arteries themselves, coupled with

shock to the central nervous system. The actual death of the animal, which follows in every case, is caused by paralysis of the circulatory and respiratory centres in the brain.

(*b*) That the actual death of the animal is effected in every case without any further operation being required.

Considerable criticism has been directed to the use of electricity as a painless method of slaughter, although no facts have been advanced in support of these theories, whilst, on the other hand, numbers of people have accidentally received currents of high voltage, and as these people are unanimous in stating that they experienced no pain or discomfort whatsoever, it is safe to assume that a current of the correct strength applied as indicated causes instantaneous unconsciousness.

(1) The apparatus consists of a transformer, voltmeter, clock, warning lamp, switch, cables and collar. It is in cabinet form and is portable. The collar, which is of horseshoe shape, is completely insulated and has two exposed swivelling contacts. It is connected by a cable to a transformer arranged with suitable tappings, so that a gradually increasing voltage may be applied. The current is applied at the designed strength for the animal for a period of about thirty seconds, which time is measured by the electric clock. As soon as the thirty seconds have elapsed, the control handle of the transformer goes to the " off " position, cutting the current and allowing the collar to be pulled away from the animal's neck by a light rope attached to it for that purpose.

The operation is performed in the following manner: The animal is not excited or frightened in any way, it receives a cold-water shower on the neck either just before entering or actually in the box. This unexcited condition is maintained up to the end, as there is an entire absence of blood in the box. This is a condition impossible to obtain where any other means of mechanical slaughter is used; moreover, the absence of fear is maintained as the collar is slipped over the animal's neck from behind, and it is therefore quite unaware that anything abnormal is going to happen to it.

(2) This is the only known method of slaughter in which the human element is entirely eliminated, and in which there is no possibility of failure. The use of any other method of mechanical slaughter is always liable to certain objections, such as carelessness or lack of skill on the part of the operator, movement of the animal's head at the critical moment, etc. None of these objections can be raised in connection with the use of the collar, as the animal either receives the full current or, in the rare event of a fault on the main supply, nothing at all.

There is no other method of slaughter by means of which an animal can be killed without experiencing any fear, and consequently from an economic point of view the advantages are obvious. This unexcited condition, coupled with the fact that the brain substance and bleeding centres are undisturbed, together with the muscular contractions produced, all combine to produce more complete bleeding than can be obtained by any other method. The meat derived from

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animals destroyed by this method being brighter in colour, more appetising in appearance, whilst the keeping properties are considerably enhanced.

Recently this apparatus has been demonstrated to different municipalities, who have sent representatives to Durban to see the collar in action, and very many encouraging inquiries are now being made prior to, I hope, its adoption by these people, and amongst one of the interested spectators at a demonstration was the Right Honourable the Countess of Verulam, who recently visited this country in connection with our R.S.P.C.A. matters, and a collar is now being made and will be sent to her ladyship, care of the Royal Society for the Prevention of Cruelty to Animals, where it is to be demonstrated before the Abattoir Expert Committee of that body, and it will be of great interest to everyone connected or interested in this work to hear their decision.

Locally over 70,000 oxen have been killed by this method, and I feel satisfied that it is in every way the most merciful death that can be given to an animal, and the economic value of the method in the better bleeding of the carcase is beyond doubt.

COMPARATIVE ASPECTS OF LOUPING-ILL IN SHEEP AND POLIOMYELITIS OF MAN.*

By W. S. GORDON.

Animal Diseases Research Association, Moredun Institute, Gilmerton, Midlothian.

By louping-ill in sheep is currently understood a disease characterised by cerebellar ataxia and disorder of brain and spinal cord functions, lasting about a day in acute infections to some weeks in chronic cases. In the latter type paralysis of one or more limbs is generally present. The mortality in definite clinical cases is high, but animals which recover do not usually develop another attack. The association of the disease with particular pastures is well established, and a large proportion of sheep brought from a locality in which louping-ill does not occur into a louping-ill district are liable to develop the disease.

The first conclusive contribution on the causation of this disease was made by Pool, Brownlee and Wilson[1] in 1930, and the earlier literature on louping-ill has already been reviewed by Pool.[2 3] These authors recorded the successful transmission of louping-ill in series from sheep to sheep by intracerebral inoculation with material obtained from the central nervous system of affected animals. The pig was also shown to be susceptible.

Features of Louping-Ill.

In continuation of the work of Pool, Brownlee and Wilson, investigations[4 5 6 7 8 9] at the laboratories of the Animal Diseases Research Association established that :

* Reprinted from the "Proceedings" of the Royal Society of Medicine, Vol. 27, p. 701 (Sect. Comp. Med., p. 11), by permission of the Honorary Editors.

(1) The infective agent is a filterable virus which is communicable to mice as well as to sheep.

(2) The pathological changes in the disease are essentially those of an encephalomyelitis.

(3) The virus may be present in an infected sheep without producing typical louping-ill, but blood drawn at an early stage of the febrile reaction, which is a prodromal symptom of this infection, contains the virus.

(4) Atypical manifestations may comprise merely a febrile reaction, or the sheep may die without lesions in the brain and spinal cord.

(5) Under natural conditions louping-ill is tick-borne, the vector being *Ixodes ricinus* L., which is habitually present on louping-ill pastures.

(6) Recovery from infection, either naturally or experimentally produced, results in immunity.

(7) The investigation of louping-ill has revealed the presence of another tick-borne infection of sheep. This disease, which has been named "tick-borne fever," is clinically, pathologically, immunologically, and ætiologically distinguishable from louping-ill, but it probably aggravates the harmful effects of the latter.

That the causal organism of louping-ill is a filterable virus is now generally accepted (Alston and Gibson,[10] and Czarkowska-Gladney and Hurst[11]). Hurst[12] infected monkeys, and Findlay and Elton[13] transmitted the disease to field voles. We possess unpublished evidence that cattle are also suspectible, and may develop the disease naturally. Rivers and Schwentker[14] record that human beings who have come into close contact with the virus of louping-ill may develop in their serum neutralising antibodies against the active agent, and illness suggestive of louping-ill infection is reported in three such individuals.

Our investigations into the pathogenesis of the disease in sheep and methods of prevention will soon be published in detail, but it may be stated here that there is a prodromal period in the naturally occurring disease characterised by a diphasic fever. Virus can invariably be detected in the blood during the early part of the first febrile phase. The second febrile phase usually marks the commencement of symptoms indicative of invasion of the central nervous system, and then virus is generally absent from the blood. Many natural cases of louping-ill, however, are abortive. In some of these symptoms of central nervous system infection appear and pass off, whilst in others the only indication is dullness accompanying the characteristic febrile reaction. Abortive attacks can be diagnosed definitely by detection of virus in the blood during the first febrile phase. This diagnosis is made by intracerebral inoculation of mice with citrated blood. There is also evidence that subcutaneous inoculation with formalinised vaccine, prepared from the brain and spinal cord of infected sheep, produces antibodies capable of neutralising virus introduced into the general circulation, thus preventing the active agent from invading the brain and spinal cord. This vaccine does not

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immunise the central nervous system, but extensive field trials show that it affords a considerable degree of protection against the natural infection. These observations suggest that the primary multiplication of this so-called neurotropic virus occurs outside the brain and spinal cord.

Comparison with Poliomyelitis.

Since this is a discussion in comparative medicine, it seems appropriate to direct attention to the somewhat similar syndrome of naturally occurring louping-ill in sheep and the course of poliomyelitis infection in man. Of course it is not suggested that the two diseases are identical, but since the pathogenesis and epidemiology of poliomyelitis are subjects of considerable controversy, the study of louping-ill in sheep may present some noteworthy features to those interested in poliomyelitis. At the outset I would mention that having no personal knowledge of poliomyelitis, I am greatly indebted to the Report by the International Committee on Poliomyelitis,[15] organised by Jeremiah Millbank of New York City.

The medical pathologist, whose material is man, is drastically handicapped by the limited extent to which experiment on the natural material is open to him. He must take his problems as he finds them, and deny himself the help of almost all the preliminary simplifications which are the essence of the veterinary pathologist's advantage. When one's patient can be used as one's experimental animal, circuitous methods of investigation in determining the pathogenesis of a disease do not require to be adopted. Thus the investigation of louping-ill has been greatly facilitated by the fact that sheep, which are naturally susceptible to the disease, are also suitable experimental animals. Such facilities permit a study of the propagation of the infective agent in its natural host, and enable one to place greater reliance on the conclusions drawn regarding the natural route of infection and the epizootiology of the disease than can be placed on similar studies with an infective agent which has been adapted by artificial methods to an experimental animal. In the case of louping-ill the mouse is a susceptible experimental animal, which we have used mainly for detecting the presence or absence of virus in a given tissue. Fortunately, sheep have been available in which to study the pathogenesis of the disease. It has not been necessary to make these studies on the mouse and to argue from the analogous disease in that animal as to the nature of the infection in sheep.

Ætiology and Symptomatology.

Each disease is caused by a filterable virus which possesses neurotropic characters. Schwentker, Rivers and Finkelstein[16] showed that immunologically louping-ill and poliomyelitis are not closely related. Incidentally, it might be noted that the poliomyelitis virus used in their experiments was the " mixed strain " virus highly adapted to the monkey. Now it appears from the work of Burnet and Macnamara,[17] Weyer,[18] and others, that repeated passage of poliomyelitis virus through monkeys causes it to change immunologically, and the

recent work of Paul and Trask[19] shows that there is a qualitative immunological difference between a freshly isolated strain from a human source and a monkey-adapted strain. Accordingly, the question of immunological relationship between louping-ill virus and a freshly isolated " human " strain of poliomyelitis virus still remains open. The incubation period of naturally occurring louping-ill is rarely less than six, or more than eighteen, days from the time of infection until the appearance of clinical symptoms. This corresponds with the incubation period of poliomyelitis infection. In the prodromal period of louping-ill infection there is usually a diphasic temperature reaction, and the second febrile phase is accompanied by the appearance of the first symptoms of nervous derangement, if these develop. This corresponds with the so-called " dromedary " type of prodromal symptom described by Draper[20] for poliomyelitis.

Virus in the Blood.

The virus of louping-ill has been detected in the blood of infected sheep concurrently with the initial rise in temperature, and in most instances a fall in temperature is followed by the disappearance of much or all virus from the blood. The virus of poliomyelitis has not been detected in human blood, but I am not aware of systematic daily examination of blood having been made during the prodromal stage. Arguing from the analogy of louping-ill, it is highly improbable that virus would be present in the blood when the symptoms of paralysis had developed. Flexner and Lewis[21] were able to show the presence of virus in monkey's blood if large quantities were drawn at the height of the disease. If the monkeys showed symptoms of nervous system involvement at the time the blood was taken, these workers were probably fortunate in detecting virus. Leiner and von Wiesner[22] also reported success in one out of five tests with blood drawn from monkeys at different stages of the disease. Clark, Fraser and Amoss[23] were successful in finding virus in the blood of monkeys in one out of ten instances ; the important point about this positive result, however, is the fact that blood was removed at a fairly early stage of infection, namely, at the beginning of paralysis on the seventh day following intracerebral inoculation.

In poliomyelitis it may yet be found that, as in louping-ill, virus is invariably present in the blood during the early stage of the febrile reaction, and generally absent from the blood when paralysis has developed. In clinically obvious cases of poliomyelitis paralysis of one or more limbs usually occurs. During epidemics the so-called abortive (Wickman type) and non-paralytic types of the disease have been recorded. The most convincing evidence of the occurrence of abortive cases has been furnished by Paul and Trask,[24] who isolated poliomyelitis virus from the throats of two patients during a characteristic minor illness which was not followed by paralysis.

In chronic cases of louping-ill, paralysis of one or more limbs usually develops, and on farms where the disease is prevalent sheep with various types of deformity are usually encountered. As already stated, the existence of abortive cases of

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louping-ill has been definitely established by the detection of virus in the blood during a febrile reaction, which was the only clinical manifestation of infection other than dullness and loss of condition : such atypical infections are followed by immunity.

Resistance and Immunity.

It is stated that the low case incidence of epidemic poliomyelitis has generally been taken to indicate that many persons are exposed to the virus without developing the typical paralytic disease. This inference, however, is only an indirect one, and not based on any direct experimental evidence. The analogous evidence in the case of louping-ill is direct, since the specific virus has been detected in the blood of sheep during a minor illness accompanied by a febrile reaction which was not followed by paralysis. Further, in one of our experiments, forty-nine susceptible sheep were exposed to the risk of natural infection for two months : 53 per cent. of the animals died from all causes, and 60.9 per cent. of the survivors had acquired immunity to louping-ill.

As in poliomyelitis one attack of louping-ill usually confers immunity, and in both diseases neutralising substances develop in the blood of infected individuals. The only reliable method of producing a typical case of louping-ill in sheep is by introducing the virus directly into the central nervous system. Subcutaneous or intravenous inoculation with virus is often followed by an abortive attack, or only a febrile reaction. In some instances, however, the typical disease, with involvement of the central nervous system, is produced. Intranasal insufflation with virus is an unreliable method of producing infection ; admittedly, infection can be produced by this route, but if it occurs under natural circumstances it must be very rare. We have now had over 2,000 sheep under experiment without observing any precautions to prevent spread by contact, and we have no evidence to suggest that infection may spread by this means. The evidence on this point in regard to poliomyelitis in man is rather conflicting.

Active Immunity by Vaccine.

In considering methods of prophylactic vaccination for the control of louping-ill it was found that the central nervous system is a difficult tissue to immunise. Thus formalinised vaccine inoculated subcutaneously does not protect sheep from virus injected into the brain, whereas it does protect against virus introduced subcutaneously. Subcutaneous injection of living virus, when followed by a febrile reaction in the inoculated animal, produces immunity of the central nervous system, but this method of immunisation is attended with the risk of setting up the disease. Since, under natural circumstances, the disease is transmitted by a blood-sucking arachnid, and the primary multiplication of virus occurs in the blood, it was considered that the immunity afforded by the formalinised vaccine might be sufficient to prevent the natural infection. As already stated, although this vaccine does not produce immunity of the central nervous system, it is proving to be efficacious in the control of the natural disease.

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Monkeys can be immunised against poliomyelitis by the subcutaneous inoculation of living virus. As in louping-ill, the method is attended by the danger of setting up the disease. To quote one example, Leiner and Von Wiesner[22] inoculated four monkeys: one died of typical poliomyelitis after four injections, one developed the marantic type of the disease, and two died of an intercurrent infection. Success has not attended the efforts to produce immunity by means of dead virus vaccines. From the analogy of louping-ill this is not surprising, since the immunised animals were tested by intracerebral inoculation.

Pathology.

The essential pathological changes in the two diseases are closely similar and are mainly confined to the central nervous system, where inflammatory changes occur with destruction of nerve cells, mainly the anterior horn cells of the cord in poliomyelitis and the Purkinje cells of the cerebellum in louping-ill. From the comparative point of view it is essential to draw attention to the fact that, although the sheep, mouse and pig are all susceptible to louping-ill, the nature of the reaction in the central nervous system of these animals varies. Thus in the case of the sheep, as the lesions suggest, cerebellar ataxia is the main symptom. In the mouse the nerve cells of the cord are mainly affected, and paralysis of one or more limbs usually occurs; whilst in the pig, which generally does not develop a fatal disease, the interstitial reaction predominates. Even in animals of the same species variation in the extent and location of lesions in the central nervous system may occur, with consequent deviation in the symptoms from those generally accepted as typical.

Epizootiology.

In forming an opinion on the epizootiology of louping-ill it is probably well to bear in mind the insulatory mechanism which guards the central nervous system from injurious substances of hæmatogenous origin. Wilfred Trotter[25] gives a very clear conception of this mechanism. After reviewing evidence he states:

"We have a group of well-defined facts established by countless observations capable of confirmation any time. They bring evidence from different parts of the nervous system, disclosing, even to superficial consideration, a clear, common tendency. The conclusion to which all point is that breaches of normal coverings of the nervous tissues, allowing contact between the latter and other tissues of the body, result of necessity in energetic local reactions. The obvious function of such reactive processes is to re-establish the normal discontinuity between neural and somatic tissues, and to break the contact that has caused the disturbance."

McIntosh and Fildes[26] showed that after intravenous injection of salvarsan and neosalvarsan in man and animals no arsenic could be found in the brain, although its presence could be detected in tissues outside the central nervous system. This phenomenon is not due to a lack of affinity between the brain and the drugs, but to an inability on the part of the drugs to penetrate into the substance of the brain.

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After subcutaneous inoculation of massive doses of potent antitoxin in sheep, we have found that although the antitoxin can be detected in the blood, its presence cannot be detected in the cerebro-spinal fluid. Whilst it cannot be argued that these substances are comparable to a living virus, the evidence suggests that injurious materials present in the blood have very definite barriers to overcome in gaining access to the central nervous system. It would appear that the epizootiology of louping-ill is closely linked with this fact, and the perpetuation of the disease in enzootic form is dependent on a high case incidence of the so-called abortive form, with a relatively low incidence of clinical cases—that is, cases in which virus has invaded the central nervous system.

This aspect of the problem may also have some bearing on the explanation of the epizootiology and epidemiology of other diseases caused by so-called neurotropic viruses. It is a practical observation that a large porportion of the old sheep on a " diseased " farm possess immunity to louping-ill, although they have no history of a clinical attack of the disease. Even in a group of yearling sheep received from diseased farms, Pool, Brownlee and Wilson found that 20 per cent. were immune, and in our own experiments it was found that after exposure of susceptible sheep to the risk of natural infection for two months, as many as 60.9 per cent. of the survivors had acquired immunity.

Endemic poliomyelitis occurs in its greatest incidence in children up to five years of age. It has an inexplicable seasonal incidence, and is generally regarded as a summer disease. Enzootic louping-ill is generally confined to lambs and yearling sheep ; it also has a seasonal incidence, occurring in the spring, and to a lesser extent in the autumn. The seasonal incidence of louping-ill corresponds with the season of maximum activity of ticks, which are the vectors of the disease. When an epizootic of louping-ill occurs in a sheep stock in which the disease has not been previously recognised, animals of all ages are liable to become affected. Similarly, epidemics of poliomyelitis in virgin soil have the same tendency. In the International Committee's Report three virgin soil outbreaks are described—one upon the island of Guam, in 1899, reported by Grunwell ; one upon the island of Nauru, in 1910, reported by Müller, and one in New Guinea, in 1929, reported by Macnamara. Each outbreak was characterised by a high mortality, mainly confined to young adults. An extraordinary feature common to each outbreak was the apparent immunity enjoyed by the children. This is a peculiar phenomenon, and might suggest that the incidence of subclinical cases in children is greatly in excess of frank cases, with definite involvement of the central nervous system, whereas the same may not apply to non-immune young adults.

Among the many opinions on the epidemiology of poliomyelitis, the one expressed by Lavinder, Freeman and Frost[27] is of particular interest. They state that " while the incidence among a population affected by poliomyelitis even in its severest epidemic form is usually not high, yet this disease possesses not infrequently the power to spread widely, in fact to become pandemic in a country. It has been suggested that an epidemic of infectious disease may be

viewed as the resultant of two excursions, a vertical one representing the heaping-up of cases in any locality, as usually shown plotted on a chart, and a lateral one, representing the extent of territory covered—the geographic distribution. Epidemic diseases not infrequently show decided variation in these two movements. Certain of them, like dengue, for example, show a most striking vertical movement along with a very limited lateral movement. Poliomyelitis has exhibited a significant power of lateral movement and up to the present time in much greater degree than its power of vertical excursion."

This " creeping tendency," as Dale[28] calls it, is suggestive of a limiting factor of host resistance, a sparse but widely spread population at risk, and a widespread virus. This opinion on the epidemiology is compatible with the view that poliomyelitis may be a systemic infection with the specific virus which, under favourable conditions, successfully invades the central nervous system, and is responsible for the symptom-complex of poliomyelitis. Such a definite view would materially assist in solving many of the baffling problems in the epidemiology of poliomyelitis.

In view of the modern trend of opinion (Walshe, Annual Meeting of the British Medical Association, 1933) that poliomyelitis is probably from the outset and exclusively an infection of the nervous system, it may be of comparative interest to draw attention to the fact that in an analogous disease of sheep, namely, louping-ill, there is a high infection incidence of the young population, a large proportion of the cases being subclinical infections which can only be diagnosed by detection of virus in the blood, and a small proportion of frank cases with symptoms indicative of central nervous system infection. Thus in the perpetuation and spread of this disease systemic infections probably have a more important rôle than actual clinical cases.

Summary.

Louping-ill, an encephalomyelitis of sheep, is caused by a filterable virus possessing neurotropic characters. Under natural conditions of infection the disease is tick-borne, the vector being *Ixodes ricinus* L. At first it would seem a curious anomaly that a blood-sucking arachnid has the rôle of transmitting a neurotropic virus, but the apparent anomaly is explained by the fact that multiplication of this so-called neutropic virus occurs primarily in the blood. Invasion of the central nervous system by the virus occurs at a late stage in the infection, and is responsible for the characteristic symptoms of the disease. In the naturally occurring disease invasion of the central nervous system is not a constant feature. Cases occur in which virus does not gain access to the central nervous system. Such abortive types of the disease can be diagnosed by the detection of virus in blood drawn at an early stage of the febrile reaction which accompanies the infection. It seems highly probable that the incidence of abortive types of the disease is greatly in excess of the number of frank cases with central nervous system involvement.

From a comparative point of view the study of louping-ill in sheep would suggest the possibility that in the early stage of poliomyelitis in man, before obvious

clinical symptoms have developed, the specific virus may be present in the blood. If such early blood infection were demonstrated present views regarding the nature of poliomyelitis infection, its prevention, and treatment would require revision.

REFERENCES.

[1] Pool, W. A., Brownlee, A., and Wilson, D. R. : *Journ. Comp. Path. and Therap.*, 1930, xliii, 253.
[2] Pool, W. A. : *Vet. Journ.*, 1931, lxxxvii, 177.
[3] *Idem, Ibid.*, 1931, lxxxvii, 222.
[4] Greig, J. R., Brownlee, A., Wilson, D. R., and Gordon, W. S. : *Vet. Record*, 1931, xi, 325.
[5] Brownlee, A., and Wilson, D. R. : *Journ. Comp. Path. and Therap.*, 1932, xlv, 67.
[6] Gordon, W. S., Brownlee, A., Wilson, D. R., and MacLeod, J. : *Ibid.*, 1932, xlv, 106.
[7] MacLeod, J., and Gordon, W. S. : *Ibid.*, 1932, xlv, 240.
[8] Gordon, W. S., Brownlee, A., Wilson, D. R., and MacLeod, J. : *Ibid.*, 1932, xlv, 301.
[9] MacLeod, J., and Gordon, W. S. : *Parasitology*, 1933, xxv, 273.
[10] Alston, J. M., and Gibson, H. J. : *Brit. Journ. Exper. Path.*, 1931, xii, 82.
[11] Czarkowska-Gladney, J., and Hurst, E. Weston : *Ibid.*, 1931, xii, 426.
[12] Hurst, E. Weston : *Journ. Comp. Path. and Therap.*, 1931, xliv, 231.
[13] Findlay, G. M., and Elton, C. : *Ibid.*, 1933, xlvi, 126.
[14] Rivers, T. M., and Schwentker, F. F. : *Proc. Soc. Exper. Biol. and Med.*, 1933, xxx, 1302.
[15] Report of International Committee on Poliomyelitis. Baltimore : Williams & Wilkins Company, 1932.
[16] Schwentker, F. F., Rivers, T. N., and Finkelstein, M. H. : *Journ. Exper. Med.*, 1933, lvii, 955.
[17] Burnet, F. M., and Macnamara, Jean : *Brit. Journ. Exper. Path.*, 1931, xii, 57.
[18] Weyer, E. R. : *Proc. Soc. Exper. Biol. and Med.*, 1931, xxix, 289.
[19] Paul, J. R., and Trask, J. D. : *Journ. Exper. Med.*, 1933, lviii, 513.
[20] Draper, G. : " Acute Poliomyelitis." Philadelphia : P. Blakiston's Son & Co., 1917.
[21] Flexner, S., and Lewis, P. A. : *Journ. Amer. Med. Assoc.*, 1911, lvii, 1685.
[22] Zappert, J., von Wiesner, R., and Leiner, K. : Leipzig : Deuticke, 1911.
[23] Clark, P. F., Fraser, F. R., and Amoss, H. L. : *Journ. Exper. Med.*, 1914, xix, 223.
[24] Paul, J. R., and Trask, J. D. : *Ibid.*, 1932, lvi, 319.
[25] Trotter, W. : *British Medical Journal*, 1926, ii, 103.
[26] McIntosh, J., and Fildes, P. : *Proc. Roy. Soc.*, B, 1914, lxxxviii, 320.
[27] Lavinder, C. H., Freeman, A. W., and Frost, W. H. : *U.S. Public Health Bull.*, 1918, No. 91.
[28] Dale, J. : *Med. Journ. Australia*, 1928, clii, 258.

ARTIFICIAL INSEMINATION IN THE DOMESTIC ANIMALS.

By ETIENNE LETARD.

Translated from *Recueil de Méd. Vétérinaire*, Nov., 1935.

(*Continued from page* 63.)

Methods of Collection of Semen.

THE following essential facts are of importance in securing semen for insemination :

(1) The semen is not very abundant in certain species.

(2) The vaginal secretions are often harmful to spermatozoa. It is desirable to employ a technique which will collect the whole of the sperm and prevent contamination with vaginal mucus. The following are the principal methods :

(*a*) *Sponge Method* was recommended by Iwanow and was used from 1898 to 1928. It consists in introducing a very fine sponge into the vagina of the female before coitus; afterwards the sponge is drawn out by forceps (using a special speculum) and gently squeezed and the semen expressed. This method is not now advocated. It has disadvantages connected with the cleansing of the sponge, which, however carefully done, always remains imperfect; some spermatozoa remain behind in the sponge, others are injured or perish, so that in the most favourable cases only 25 per cent. of the spermatozoa are available for insemination, sometimes as many as 99 per cent. of them are lost. These variations depend on the absorption capacity of the sponge: when there is little semen, as in ruminants, more is absorbed and relatively more of it is lost. The length of the time of survival of the expressed spermatozoa is diminished by 40 to 50 per cent. The sponge is soaked by vaginal secretions which may be harmful on account of their acidity; and since in the bull an ejaculation may give about 5 c.c. of semen, while when a copious vaginal secretion is present up to 20 c.c. may be expressed, undue dilution may easily occur. The disadvantages are more serious when the secretions are pathological. Inconvenience may occur when vaginal malformations exist; these may hinder the impregnation of the sponge by the semen ejaculated at the moment when the male leaves the female. Sometimes vaginal folds or pockets or excessive dilatation of the neck of the uterus makes collection precarious. Finally, the sponge becomes impregnated itself with bacterial flora and cannot be rendered aseptic. It must, nevertheless, be recognised that this method has given Iwanow and Pirocchi, of Milan, good results in cattle.

(*b*) *Speculum-collector Method.*—A speculum, with the inferior branch provided with a deep groove in which semen collects and by which it flows to an opening outside and thence into a receptacle, is used. The speculum is sterilised in the flame of a spirit or blow lamp and then rinsed with a physiological fluid. It is introduced on the slope and manipulated as a kind of spoon by which the semen deposited on the floor of the vagina is scooped up. In natural light, or better with a small electric lamp, the operator can observe when the collection is complete; if some semen remains it can be collected by a second attempt, and generally two or three manuœvres of the speculum, using a rotatory movement, are sufficient to avoid wastage. With a view to avoiding contamination of the semen by pathological vaginal secretions, only mares which have been examined and are absolutely healthy are used; these must be kept at insemination centres. At first they do not accept service in interœstral periods, but by the use of hobbles they can be forced to accept the male, and become accustomed to service at any time. These mares are of great value as a means of collecting semen. They are kept for use by specific stallions only, and remain free from risks of coital infection. To avoid loss of semen through micturition, water is withheld for ten hours before service, and the rectum is emptied of fæces manually.

As regards the stallion, precautions are also necessary; the penis is cleaned with warm water, especially at the beginning of the covering season. For

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stallions which are very sensitive to handling of the penis, two or three leaps are given, from which the semen is not used; in this way the organ mechanically cleans itself. By observing these details, a good quality semen is obtained. But the method is only applicable to those species giving a considerable quantity of semen and in which the majority is deposited in the vagina. It is practically restricted to equines.

(*c*) *Method of the Sperm Collector Placed in the Vagina.*—This collector is made from very fine and supple indiarubber. It is 38 to 40 centimetres long for large animals and 12 to 14 centimetres for the sheep. The anterior extremity, which fits into the fundus of the vagina against the cervix, is a *cul-de-sac*; the posterior extremity has an opening generally furnished with a valve to prevent the escape of semen; this external portion is finished off with a rigid indiarubber plaque which lies against the lips of the vulva. At about the junction of the middle third and posterior third of the collector is a circular hollow ring of reinforced indiarubber, with a reservoir which can be inflated by blowing through a thin tube passing outside and closed at its end. This ring, when blown up, enables the collector to retain its position, since when the apparatus is *in situ* it lies in front of the vulval sphincter. The collector is adjusted in the vagina by hand; a tampon of sterile cotton wool held by sponge forceps can be used to aid insertion and to obliterate folds of vaginal mucosa.

Before use, the collector is disinfected by rinsing with absolute alcohol at 65 degrees for five to ten minutes; it is dried by emptying and allowing the alcohol to evaporate, taking care that no trace of alcohol remains in the interior. The outside of the collector and the inside of the vagina are lubricated with white vaseline distributed evenly over both surfaces.

At the beginning of coitus the penis is directed towards the external opening of the collector, and the ejaculate is collected in its cavity. The spermatozoa thus obtained are of excellent quality and motility is vigorous. The method is applicable to the horse, ox and sheep. Often after service the stallion carries away the collector adherent to the penis, thus the last fractions of the semen are saved.

(*d*) *Method of the Artificial Vagina.*—For this an apparatus is utilised which replaces the vagina of the female. It is not attached in any way to the female, but is held by the operator, who places it within reach of the penis at the moment of coitus, after the male has mounted the female. The ejaculation is received into this apparatus. Some minor variations of this procedure are carried out in different species of animals. The following is the description of the artificial vagina used in England (Walton's model): It is essentially composed of double walls with a watertight space between. The external wall forming the framework of the instrument is metallic; the internal wall is made of membranous pliable indiarubber, with which the penis comes into contact. The two walls are fixed to each other at either end, the extremities of the indiarubber lining oversetting the extremities of the metallic wall, where they are held in position by

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metal rings. The metallic wall is furnished with two handles by which the operator holds it, and at the moment of coitus adjusts its position so that the penis enters it. The whole is covered with felt to insulate the instrument against variations of temperature. The space between the two walls is provided with a tap to receive warm water and air. This ought to be at a temperature of 40° to 42° C.; a temperature of 38° to 39° C. is insufficient, since below 42° C. the vitality of the spermatozoa is lowered. The quantity of water in the jacket should be enough to render the internal wall sufficiently tense to assure adequate friction on the penis. The anterior extremity of the artificial vagina communicates with a glass receptacle which fits into the rubber wall within the metallic outer wall. The posterior extremity of the tube is open for the introduction of the male organ. Some details of technique are important; the interior of the artificial vagina should be rinsed with a warm 2 per cent. solution of soda. It is dried and swabbed by forceps, holding a tampon dipped in alcohol; so that the alcohol may evaporate quickly, warm water is poured between the walls and afterwards drawn off.

This method is much to be recommended, and appears to many authors the procedure of choice, utilisable in the horse, ox, sheep and pig. It does not appear to be necessary for the female, which plays a secondary part, to be in season—her co-operation can be ensured by hobbles; or females may be specifically trained to play the necessary inactive part in the collection of semen.

(*e*) *Method of Collection by Means of an Artificial Female.*—If one can deceive the male so far as to dispense with the reproductive organs of the female, hitherto considered indispensable for mating, may not one replace the female herself by a mechanical contrivance? This is only a question of skill and artifice. Experiments have shown that this can sometimes be achieved. In this method, which is entirely artificial, the " female " is constructed of a metallic framework, well padded and covered by a skin or simply a cloth; at the rear of this dummy female is a cavity in which is fixed the artificial vagina, described in the previous section. The false representation of the female need not be very accurate. Instances are on record of males of one species serving phantom females of another species, but this is not usual.

The method of employing a mannequin is employed practically in certain insemination centres in Russia for large and small ruminants and for pigs; it seems to be only exceptionally employed for horses, and then only for laboratory purposes.

(*f*) *Method of Collection by Electric Procedure.*—Some authors describe a method of sperm collection by the use of electric currents. Gunn, in Australia, carried out experiments based on the work of Moore and Battelis, who had employed guinea-pigs earlier, and who had shown that it was possible to cause ejaculation by means of an electric current applied to the head. Gunn devised a method of exciting the lumbo-sacral region by electric stimuli and produced the emission of semen containing numerous spermatozoa very similar to, or identical with, a normal ejaculate. Numerous experiments showed that the best results were

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obtained with an electric excitation lasting three to five seconds and repeated after an interval of five to ten seconds, on some eight to twelve occasions.

Good results were obtained with an alternating 30-volt current of a frequency of fifty periods per second, frequently interrupted. One pole was introduced into the rectum, the other, consisting of a sterilised needle, was implanted into the dorsal muscles alongside the kidney at the level of the third or fourth lumbar vertebra. The fundamental interest of this method consists in the possibility of making a series of successive collections of portions of the semen. The first portion, containing very few spermatozoa, comes from the accessory sexual glands, the second contains the greater quantity of spermatozoa and a minimum of secretory glandular products. By this method the semen is very rarely con-contaminated with urine, which inhibits much of its potency, although it is possible to inseminate sheep successfully with such urine-contaminated semen. The number of spermatozoa obtained by this method may be four times greater than in a normal ejaculation. The average volume of the collection in rams was 2 c.c., the bulk of which was furnished by the accessory glands. The sperms thus obtained seem to lend themselves well to methods of preservation. At a temperature of 14° C. the normal duration of life was between 48 and 76 hours; at 4° C., in tubes closed with a plug of cotton wool and only slightly exposed to air, the average duration of life of 400 examples was 12 days. Some very carefully secured samples have lived 18 to 22 days. Previous injections of pituitrin in the guinea-pig have enabled the sperm to live 64 days. Sheep inseminated with sperm obtained by the electric method gave fertility percentages comparable to those found in natural breeding. The technique of obtaining semen by electricity was used on 60 rams in the course of 400 tests; on some of these, 20 excitations were carried out. No mishaps occurred except in one case where a voltage of 80 to 90 was made by mistake.

(*To be continued.*)

Clinical Articles

Cases of Radiological Interest.

By Major G. E. OXSPRING, O.B.E., F.R.C.V.S., R.A.V.C.

Fractured Pedal Bone.

A LIGHT draught-horse, aged twelve years, was admitted to hospital with a history of having slipped up whilst walking in a mess cart. The lameness was very acute on the near fore limb and evidence of pain was distinctly manifested on manipulation of the shoulder, any movement of which was resented. The horse had every appearance of a severely wrenched shoulder, with the possibility of a second seat of injury. After treatment in slings for a month the patient exhibited a characteristic action when walked; the shoulder was moved freely,

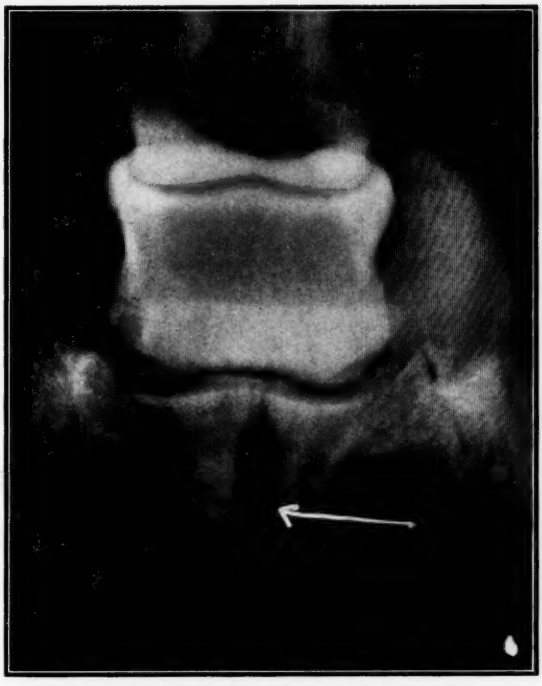

FIG. 1.—Radiograph showing fracture of the os pedis.

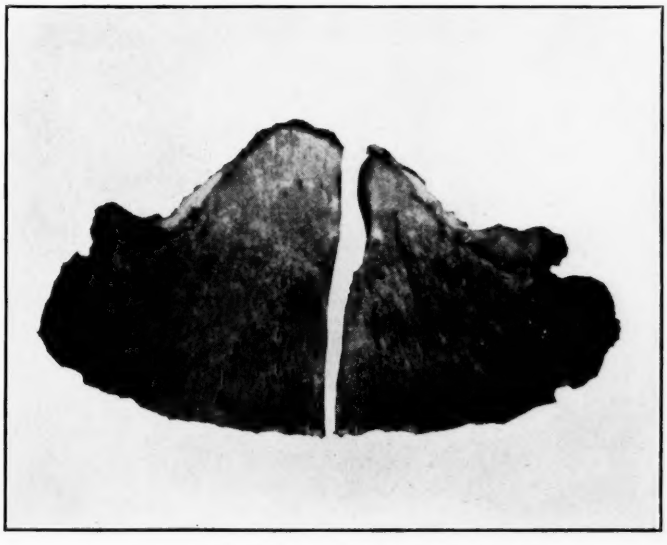

FIG. 2.—Photograph of the fractured pedal bone.

(*Article by* Major G. E. Oxspring, O.B.E., F.R.C.V.S., R.A.V.C., *page* 96)

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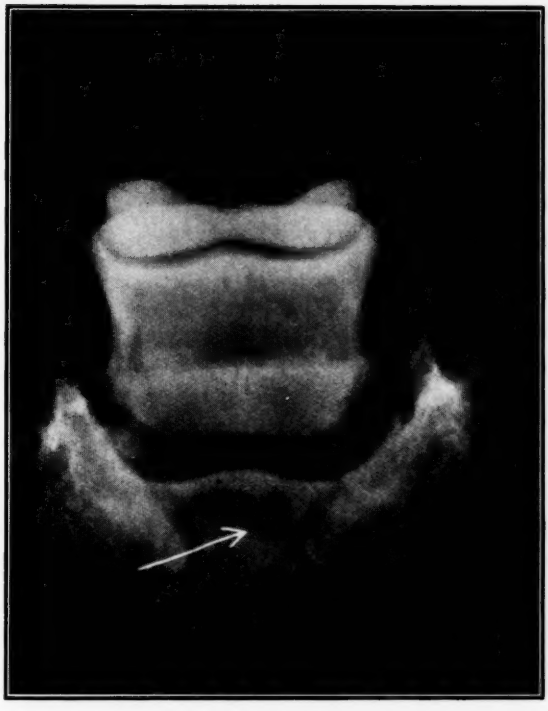

FIG. 3.—Radiograph of the digit, showing a shadow beneath the pyramidal process.

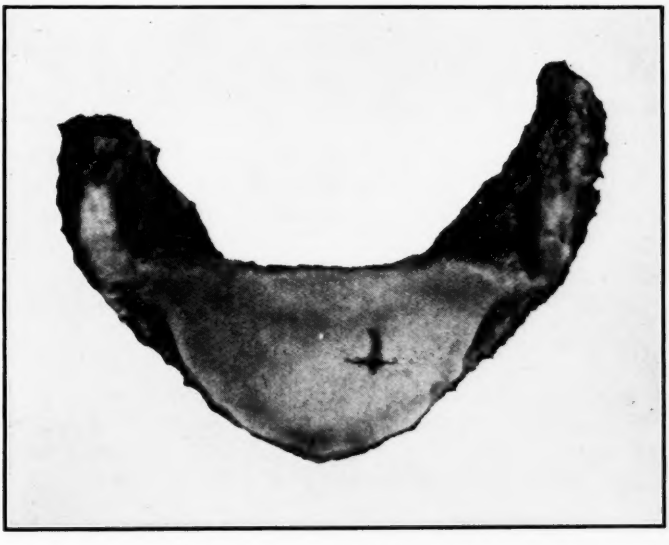

FIG 4.—Photograph of the articular surface of the pedal bone, with an erosion.

(*Article by* Major G. E. Oxspring, O.B.E., F.R.C.V.S., R.A.V.C., *page* 96)

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but the limb was carefully extended so that the weight was placed on the heel. Plantar nerve block was performed, and resulted in the horse going sound at the walk and trot. No evidence of fracture of the phalanges could be recognised clinically. The animal was sent to the writer by ambulance for X-ray examination five weeks after the injury, and as fracture of the os pedis was apparent, destruction was advised. The X-ray negative is reproduced, and shows very clearly the line of fracture from the pyramidal process to the toe of the pedal bone, appearing as two black lines.

The duplication of the fracture lines may at first give the impression that the bone was fractured in two places. This, however, was not the case, as the pedal bone was separated by a simple fracture into two pieces, as illustrated in the photograph of the macerated bone.

The fracture was not directly antero-posteriorly, in which case the rays passing straight through would have given a single shadow, but it deviated slightly in a lateral direction, more particularly towards the upper end.

Although a space existed right through the bone, it is only apparent on the radiograph anteriorly and posteriorly owing to the fact that the rays are straight and the fracture slanting. This explains the double fracture lines on the negative. The radiograph was taken anterio-posteriorly in the upright pedal route.

Arthritis of the Coronary Joint.

A valuable hunter gelding, aged six years, was sent in for X-ray examination, with a history of subacute lameness on the near forelimb of a month's duration. A radiograph in the anterio-posterior direction had a faint but definitely abnormal shadow immediately below the outline of the pyramidal process of the pedal bone, with a crater approximating the articular cartilage of the pedal joint. A carious area in the pedal bone below the articular cartilage of the pedal joint was diagnosed, with possible involvement of the joint, and a guarded prognosis given. The horse was turned out for twelve months, and appeared to improve, but went very lame immediately he was put to work again. A further radiograph showed that the shadow had not extended, but was more distinct, indicating that the disease had progressed. The horse was destroyed and a post-mortem examination revealed an ulcer of the articular cartilage with much discoloration around it. A deep erosion also existed in the bone beneath the ulcer, which is illustrated in the photograph.

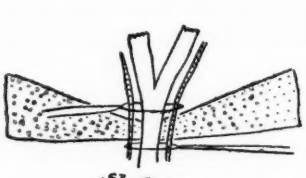
A Method of Dealing with the Uterine Stump.

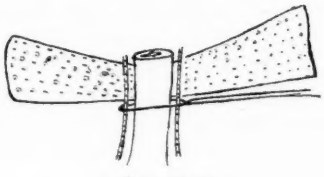
By J. McCUNN.

Royal Veterinary College, London.

DURING the last few years attention has been drawn to the treatment of the uterine stump following "hysterectomy" in the smaller animals. Merrilatt, Smythe[1], Wright[2] and the writer[3] have described various methods. The aseptic

stump met with in simple spaying operations gives little cause for alarm. The septic stump associated with the so-called "pyometritis" necessitates the observance of extreme care. There is no doubt that whatever method is followed the benefit of covering the stump with peritoneum cannot be





overestimated. A technique which I have followed for some time and has given satisfactory results is as follows:

The uterus is ligatured in two places, the posterior ligature being as near the cervix as possible. Strong silk is used, or preferably Coats' No. 1 thread. Clamps are not used. The ligatures are placed approximately half-an-inch apart and they include the uterine vessels. The ends of the posterior ligature are left about six inches long and then free ends caught up in forceps. Triangular sections are now made in the broad ligament, one on either side of the body of the uterus. The apices of the triangles are near the posterior ligature. It is still attached to the body of the uterus. The sides and bases of the triangle are free. The bases are seized by forceps. The uterus is now severed between the ligatures, care being taken to prevent soiling of the abdominal wound and its contents. By pulling on the attached ligature an assistant now draws the stump clear of the abdominal wound. The exposed end is cauterised with carbolic acid (B.P. liq.). Excess of acid is now removed.

The triangular flaps of peritoneum are wrapped around the stump, one clockwise and the other anti-clockwise. They fold gently over the stump, forming as it were a cap. A ligature of fine silk or catgut is passed around the stump and its coverings posterior to the position of the main ligature. The main ligature is severed close to its knot and the stump slides back into the abdomen. On inspection the amputated end of the uterus will be seen to be lying in its normal position and completely covered with peritoneum.

REFERENCES.

[1] Smythe, R. H. (1931): *Vet. Record*, Vol. 11, p. 1018.
[2] Wright, J. G. (1933): *Vet. Record*, Vol. 23, p. 1378.
[3] McCunn, J. (1932): *Vet. Record*, Vol. 12, No. 19, p. 511.

The Value of Earths or Dry Soothing Powders in Discharge from the Cavity of the Ear.

By HENRY GRAY, M.R.C.V.S.

Kensington.

CATARRHAL or muco-purulent discharge from the ears, seen so often in dogs such as spaniels, with recurrent eczema, especially of the eyelids and muzzle, is rapidly checked by dropping into their cavities fuller's-earth or china clay, technically termed "kaolin." After the ear has been filled with the powder the root of the ear should be manipulated between thumb and forefinger so that the powder is worked down towards the drum and between the crevices or pockets in the lining membrane of the wall of the cavity. If this is repeated two or three times a day the secretion usually dries up. In acute cases of eruption inside the flap and the cavity, so often seen in distemper, dry powdered oxide of zinc is preferable.

I do not believe in poking into the cavity cotton-wool on forceps; nor is there necessity for syringing into the ears of dogs or cats fluids, as is so often done. They have wide, funnel-shaped channels, not like the narrow piped ones as in the human subject. Poking the ears is likely to press down towards the drum discharge and caked dressing, which, if it cannot be shaken out by the animal, acts as a foreign body. No class of disease requires such skill in treatment as that of the ear of the dog. Some seem to consider there are only two or three diseases of the ear, generally termed "canker," which can be remedied by one or two dressings to be applied by the owner when he thinks fit. They are maladies which can be treated only by the skilful practitioner. A remedy is like a paint or colour—it requires an artist to apply with skill so as to obtain good results.

THE PRESERVATION OF FODDER CROPS.*

From the Director of Publications, H.M. Stationery Office.

THE agricultural world has heard much about the extraordinary nutritive value of grass and other green crops cut when young at a few inches height, and also about the possibility of preserving their special qualities by artificial drying. Hitherto it has been difficult to discover the exact stage of development which these investigations have reached, but in the report just issued by the Agricultural Research Council, entitled "Report by a Committee on the Preservation of Grass and other Fodder Crops" (A.R.C., Report Series, No. 1) an authoritative account of the whole subject is given.

*"Agricultural Research Council—A Report by a Committee on The Preservation of Grass and other Fodder Crops." Price 1*s. 6*d. net, postage extra. Obtainable: London—Adastral House, Kingsway, W.C.2; Edinburgh—120, George Street; Cardiff—1, St. Andrew's Crescent; Manchester—1, York Street; Belfast—8, Chichester Street.

In March, 1933, the Agricultural Research Council called a conference of some of those interested, and as an outcome of this conference the Council, after consultation with the Ministry of Agriculture and Fisheries and the Department of Agriculture for Scotland, appointed an expert committee, under the chairmanship of Sir William Dampier, to investigate the question. It is the joint report of that committee and of its two sub-committees that is now before us.

After a short introduction, the first sub-committee deal with present methods of preservation—haymaking, ensilage, etc.—and the possibilities of new methods. The sub-committee show that the artificial drying of grass in the usual hay stage does not promise to be a paying proposition, but with grass cut short at intervals throughout the season they give figures to prove that the special feeding value shows a good prospect of economic success.

The second sub-committee give an account of methods of cutting and collecting young grass, the physical principles of drying grass, the general features necessary in a herbage drier, the special practical requirements of a farm drier, the cost of drying, and the methods of processing and storage.

In a first Appendix descriptions are given of the driers now on the market or approaching that stage, with special reference to those fit for use on farms, as distinguished from large factory scale driers, which are referred to in summary form only. In spite of much talk and newspaper comment on crop driers, the committee find that the number available for potential purchasers is very small indeed. The second appendix contains a full bibliography, from which references to more detailed information can be found. All those interested in the preservation of crops should read this report.

LIVESTOCK FOR NEW ZEALAND.

A LETTER has lately appeared from Mr. Hobson, Secretary, National Pig-Breeders' Association, with reference to lifting the embargo against the importation of stock to New Zealand. It was hoped that the new Labour Government might favour the lifting of this embargo, but according to the latest information they have refused to do so as the majority of farmers are against the risk (?).

The following information from a veterinary adviser to one of our Dominions who is very familiar with the exportation of pedigreed stock is very interesting and worthy of careful consideration by those responsible for the heavy charges made in connection with the exportation of stock.

" The following are facts which militate against the export of pedigree stock :

" The total transport costs alone in the case of cattle amount to about £90 for a single animal. Included in these costs are the quarantine charges made by the Ministry of Agriculture. These include a fee of £2 10*s*. for inspection by the Ministry's officers on the farm and £4 5*s*. for maintenance in quarantine. A serious complaint, however, is against the Ministry's ' value ' charge, which is an extra charge of up to £10 according to value on cattle of an insured value of

over £100. Thus, on only a moderately high-priced animal the quarantine charges may amount to £17, or some 18 per cent. of the total transport costs.

" A similar ' value ' charge of up to £1 per head is made in the case of sheep valued at over £30. Only in rare cases are ewes imported (the transport costs of sheep—about £32 per head—are out of all proportion to the value of ewes), and therefore in the case of practically all sheep exported to Australia there is added a ' value ' fee to the quarantine charges which, with an inspection fee (on the farm) of £2 10*s*., amount to about £4 10*s*. per head—some 12 or 13 per cent.

" In the case of pigs, the ' value ' charge is made on those valued over £40. Therefore it is not unusual for pigs to escape. Nevertheless, quarantine charges amount to some £6 10*s*. per head (including inspection on the farm), which is about 18 per cent. of the transport costs.

" It need only be added that the freight rates for shipment of stock to Argentina are little more than half the rates to Australia, and that no expenses regarding quarantine (before departure) have to be met, and it is clear why the numbers of stock imported into Australia in recent years may have been disappointingly small. In fact, with the heavy rate of exchange and the low prices of Dominion frozen beef compared with the prices of South American chilled, it may surprise some people to know that since the shipments were resumed in 1929, after a long interval, when foot-and-mouth disease was very prevalent, there have been shipped to Australia the following : cattle, 536 ; sheep, 438 ; pigs, 107.

" The cattle have included bulls which cost up to 5,000 guineas to land in Sydney, and the sheep—rams—costing well over 200 guineas."

Abstracts of Current Literature

A Note on New Dressings for Fly-Struck Sheep. By M. R. FRENEY, B.Sc.,* I. M. MACKERRAS, M.B., Ch.M., B.Sc.,† and M. J. MACKERRAS, M.Sc., M.B.‡ From the *Journal of the Council for Scientific and Industrial Research*, Vol. 8, No. 3, August, 1935, in which a full report appears.

In the course of experiments on the chemical treatment of standard minced liver baits, it was found that amongst the substances which rendered the baits almost completely unattractive to flies were boric acid and glycerine. It was known that these could be combined to form various acids and esters. It was also known that boric acid, though difficult to apply effectively, was highly regarded by some pastoralists as a dressing for strikes, and that *glycerinum acidi*

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borici was a pharmacopœial preparation for the treatment of inflamed skin, and mucous surfaces. Consequently it was decided to test the efficacy of these acids and esters as dressings for the treatment of blowfly strike.

Preparation and Characters of the Dressings.

The preparations with which most work has been done are made in the following manner :—

Glyceroboric Acid.—61.8 gm. of boric acid are dissolved in 280 gm. of warm glycerine. The resulting clear solution contains 3.16 per cent. of boron, or, calculated as boric acid, approximately 18 per cent.

Mono-boric Preparation.—One mole (61.8 gm.) of boric acid is dissolved gradually in one mole (92.1 gm.) of hot glycerine. The mixture is stirred and heated to 150° C. when 228 gm. of cold glycerine are added. The resulting clear solution contains 3.16 per cent. of boron, or, calculated as boric acid, approximately 18 per cent.

Di-boric Preparation.—Two moles (123.6 gm.) of boric acid are dissolved gradually in one mole of hot glycerine. The mixture is stirred and heated to 150° C., when 320 gm. of cold glycerine are added ; it is then warmed until it becomes quite clear. It contains 4.50 per cent. of boron, or, calculated as boric acid, approximately 26 per cent.

Tri-boric Preparation.—Prepared similarly to the di-boric preparation, except that three moles (185.4 gm.) of boric acid are dissolved in one mole of hot glycerine, and 410 gm. of cold glycerine are subsequently added. This preparation contains 5.27 per cent. of boron, or, calculated as boric acid, approximately 30 per cent.

These preparations are acidic glycerine boric acid compounds dissolved in glycerine. They are colourless, odourless, hygroscopic, somewhat viscous fluids, the glyceroboric acid being the least and the tri-boric preparation the most viscous. They are soluble in alcohol, and, though miscible with water, they are hydrolysed by it, a copious precipitate of boric acid being formed. This, as will be seen later, is an important property.

The Properties of a Dressing.

A satisfactory blowfly dressing for sheep must possess the following properties : (1) It should be easy to apply, penetrate readily, adhere well to the fleece and skin, and persist ; (2) it must be absolutely harmless to the normal skin ; (3) it must not be toxic to the sheep if absorbed through a wounded surface ; (4) it must kill the maggots, and must prevent the formation of fresh pockets by maggots wandering away from the dressed area ; (5) it must not impede healing, and should have a beneficial effect by protecting the wounded surface and reducing bacterial invasion ; (6) it must prevent re-strike, either by rendering the area unattractive to flies or by killing the maggots that may hatch from eggs laid subsequently ; (7) it should not reduce the commercial value of the fleece ; (8) it should be cheap.

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Examination of the Dressings.

As few field strikes were available for treatment, the new dressings have been tested chiefly on artificial strikes in the insectary. The strikes are produced by thoroughly wetting a selected area on the sheep and then applying about 2,500 newly-hatched *Lucilia cuprina* or *L. sericata* maggots. After seventy-two hours the maggots are nearly full-grown, and the skin is more or less extensively invaded. In this way we have in the past three months (mid-March to mid-June) produced 130 primary strikes on 55 ewes.

(1) *Application of the Dressings.*—These dressings do not spread spontaneously, but are easily rubbed in, and then penetrate readily to all parts of the strike, including cracks and folds. They adhere well to the fleece, skin, and wounded surface, and, because they hydrolyse in the presence of lymph, the struck area is thoroughly impregnated with boric acid. Consistency is satisfactory in warm weather, but in cold weather some of the dressings are thicker and stickier than is desirable. It is a small but practical point that these dressings are pleasant to use, and prevent the smell of the strike from persisting on one's hands.

(2) *Effect on Normal Skin.*—A scab or crust in the fleece greatly increases susceptibility to strike. Consequently, any dressing which produces an inflammatory reaction on normal skin is regarded as definitely harmful. To test this point, we shear closely an area four inches square, apply the dressing liberally, and rub it in gently. A similar area is treated with water, as a control, because some skins are so tender that mere clipping and rubbing may produce a mild reaction. If the dressing be harmful, swelling and redness will be seen in twenty-four hours, followed by hardening, and within a few days a definite crust will be formed. This method is quite simple, and graziers are urged to test for themselves every dressing that they propose to use on their flocks.

(3) *Toxicity to Sheep.*—We have not observed any signs of poisoning in sheep treated with the glyceroboric preparations, nor have we heard of any reported by graziers who have used boric acid dressings.

(4) *Effect on the Maggots.*—Soon after the dressing is applied to a strike, the maggots become restless and cease to worry the sheep. Many wander down through the fleece and drop to the ground. Those that remain become obviously sick, and die between six and thirty hours after treatment. This description applies particularly to treatment with the mono-, di-, and tri-boric preparations, the last being the most actively larvicidal. In none of the seventy-eight strikes treated with these three preparations have the maggots remained healthy long enough to produce further damage to the skin, although pockets of dying maggots may sometimes be found in the fleece.

(5) *Effect on the Wounds.*—Within twenty-four to forty-eight hours inflamed but unbroken skin returns to normal, and the pitted and ulcerated areas become covered with a firm, clean scab. Deep pockets of invasion into the subcutáneous tissue may not be completely covered for another day or two. The scabs remain more flexible and less liable to crack than those formed after other treatments,

and they usually lift from the newly-formed skin in ten to fourteen days in moderately severe strikes. Wool growth from the healed area is satisfactory. Suppression of sepsis is not always complete, with the result that there is not infrequently a minor degree of exuberant granulation, and occasionally small abscesses are found.

(6) *Prevention of Re-strike.*—Using the technique described above, we have made twenty-two attempts to produce re-strikes on areas that have been treated with the glyceroboric dressings, the intervals between dressing the strike and attempting a re-strike ranging from four to forty days. None was successful, although other re-strikes and strikes on crusted areas were easily produced under similar conditions during the same period. In addition, as mentioned above, a shorn area was treated with kerosene, and next day half of it was dressed with glyceroboric acid. It proved easy three weeks later to produce a strike under the scab on the half treated with kerosene alone, but an equal number of maggots failed to develop under the scab on the dressed half.

So far as our observations go, all the glyceroboric preparations appear to be equally effective in preventing re-strike. These results are encouraging, but field tests are essential before a definite conclusion can be reached.

(7) *Effect on the Fleece.*—The glyceroboric preparations neither discolour nor adversely affect the value of the fleece.

Any convenient tin or other receptacle may be used for manufacturing the preparations. They must not be diluted with water and should be kept in air-tight bottles or tins, because the boric acid tends to separate out on exposure.

Conclusion.

The glyceroboric dressings have given decidedly better results under experimental conditions than any other preparations we have examined. Whether they will prove entirely satisfactory in practice remains to be seen. Further investigation is definitely required besides experimental and field studies to test the conclusions already reached.

Intoxications of Vegetable Origin. By A. HENRY. (*Concluded from p.* 369, Vol. 91.)

Umbelliferæ.—The Umbelliferæ family is one of the most plenteous in toxic plants. I cannot study all the species in detail, I will only instance some common types :

The hemlocks, of such bad reputation, have as the principal species the tall hemlock, or *Conium maculatum*, a biannual plant whose active principle is an alkaloid liquid and volatile, *viz.*, conicine. The plant is toxic in all its parts, but in different degrees ; it is most dangerous at the end of the summer of the first year of its vegetation.

Animals rarely touch it spontaneously. Intoxications occur when through ignorance hemlock is distributed in the rack with other bad herbs. The lethal

dose for the horse is from 2 to 2 kg. per 500; for an ox, 4 to 5 kilos. The sheep and the goat, although less sensible to the tall hemlock, may succumb, and the pig also.

Æthusa cynapium, fool's parsley, has a very debatable action. It is not toxic for the rabbit or dog. The flower and fruit are most toxic. The young plants springing up on dry and sun-warmed earth are most toxic. Goats may eat fool's parsley, but the milk is dangerous for man.

Aquatic Hemlocks.—Under this name numerous species of hemlock are classed, of which the chief are: *Cicuta virosa*, the true aquatic hemlock, whose toxic principle, cicutoxine, a resinous substance, is very noxious. Poisonings by this plant in animals are really very rare. Sheep and goats can eat it without any great inconvenience. The water parsnips, notably *Sium latifolium* and *Sium augustifolium*, are most of all poisonous in their earth-covered parts. The aquatic phellandra (*Phellandrium aquaticum*), little toxic in the young state, increases rapidly in activity, and as the species expands extensively in low, damp ground, it is one of the Umbelliferæ causing most accidents in dry, scarce years. Oxen show sweating and nervous phenomena which resemble intoxication; they bellow, roll on the ground, knock the head against trees; many die. Hæmorrhagic lesions are often seen in different points of the body.

Vlei Poisoning.—In South Africa the name of vlei poisoning (valley poisoning) is applied to a malady which originates above all in spring in certain damp parts of valleys, and in which the symptoms are much similar to accidents due to our *Phellandrum aquaticum*. A whole rank of plants is incriminated, and comprises Ranunculacæ, horse-tails, *Sium cyperacæ* (Scirpus, Carex, Pycreus). In certain regions water parsnips represent 95 per cent. of the vegetation; in others it is above all, the Pycreus that abound. The essential fact to retain is that isolated plants experimented on have not reproduced symptoms, but these have been caused by mixtures taken up along with them. This opinion is very interesting. We ought to apply it to the study of some of our pasture troubles still badly defined. You know, for example, that there exists in the ox a chronic diarrhœa which neither bacteriology nor parasitology throws light on, and that a hæmaturia of a toxic kind exists, of which we do not know the exact nature. Perhaps there exist intoxications due not to isolated vegetable species, but to a whole number of groups, upon which research is necessary. In low pastures one can already suspect the Gratiola (*Gratiola officinalis*), the Pedicularis (*Pedicularis palustris*), the Nummularia (*Lysimachia nummularia*), the Rhinanthias.

Œnanthe crocata.—Among all the aquatic hemlocks, this deserves special mention. It is very common in the West of France and very toxic for animals. It flourishes in marshy regions and, above all, in ditches. Its fasciculated root comprises five or six fleshy tubercles, fusiform and white, containing a milky juice which becomes yellowish saffron-coloured. Accidents always occur in the same way: when the ditches are cleaned out and the roots thrown out on the edges. These roots have a sweetish and aromatic taste which facilitates mistakes;

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cows, goats and pigs easily poison themselves. Accidents are serious, and death is frequent. The flesh of the intoxicated animals does not appear to be toxic (Bretagne). The active principle is a brown resinoid substance—œnanthotoxine.

Fennel.—Fennelism is chiefly an intoxication of the North of Africa. Common fennel (*Ferula communis*) grows abundantly in the prairies and causes heavy losses in cattle each year. The active principle is not yet well known, for the alcaloid fenuline does not seem to produce proved accidents. These have a certain analogy to an infectious malady, and for a long time the true nature of fennelism has been discussed. As a whole, poisoning by fennel is characterised by hæmorrhagic and congestive processes with a predilection for the mucosæ and conjunctive tissue: nasal hæmorrhages, blood diarrhœa, hæmaturia. The mortality is quite regular.

Solanacæ.—All plants of the Solanacæ family are more or less toxic; in a great number of them one finds solanine accompanying the chlorophyll; in others one finds very active alkaloids such as atropine, hyoscyamine, scopolamine. Poisonings by all these plants are quite well known, and I have not time to put the elements before you. Besides, you know all the properties of these great alkaloids.

Compositæ.—In the great family of Compositæ the number of dangerous or suspect species is considerable. I will only dwell here on two types of intoxications which do not yet figure in classic works :—

Senecias.—The senecias are banal plants which everybody knows are not devoid of toxic properties, and I must point out a few of the accidents they are capable of producing in animals. Their toxicity was first recognised thirty years ago in New Zealand. What interests us rightly, the species incriminated is *Senecio jacobea*, one of the commonest plants in the pastures of France. It was recognised that horses and cattle which pastured on surfaces well stocked with the plant suffered from accidents, at that time known as the "malady of Winton," evolving quite fatally. Some years later it was found that in South Africa, dunkopziekte, or dikkopziekte, was due to the ingestion of two species of Senecio—*Senecio latifolius* and *S. burchelli*.

In different countries of Europe (England and Ireland) in these later years it has been recognised that accidents are quite often attributable to *Senecio jacobea*. I do not believe that in France, up to the present, examples of intoxication by Senecio has been observed, but I am pretty certain that they exist, and that they remain unrecognised. In general, animals do not touch Senecio of Jacob in pastures, which, forming one of the bases of rough tufts, the animals appear therefore to be warned; however, it is easy to see that, forced by hunger in a period of dryness or in a pasture too overstocked with animals, they come to ingest the toxic plant. It may be added that the poison is not quick in action; it requires repeated ingestion, almost continuous, for several weeks, for the symptoms to appear. The delay in the appearance of symptoms may perhaps be quite long —several weeks—several months—after the animals have ceased to consume

the plant. Under these conditions one can easily understand how accidents cannot always be attributed to their true cause. When the symptoms appear it is too late to intervene and a fatal outcome results. In all probability hay containing a notable proportion of *S. jacobea* may also cause accidents. The horse is particularly sensitive ; cattle less so ; sheep resist quite well.

The symptoms observed are little, precise. In milch cows lactation is diminished and even suspended, the animals show rapid falling away in flesh, although appetite may be preserved and even exaggerated. The principal sign of intoxication is shown by an atrophic cirrhosis of the liver. At the autopsy one sees a characteristic viscera : atrophied, granited, hard and rugous ; the microscopic lesions are those of intense cirrhosis. A curious point—the gall-bladder is often very dilated, it sometimes attains nearly half the volume of the organ, so much is the liver atrophied. When the symptoms are established the cirrhosis is already there ; one can then understand very well that no medication can do good. Two alkaloids have been extracted from the Senecio of South Africa : senecifoline and senecifolidine. Their action has been tested on laboratory animals, notably the cat. In moderate doses the principles act as stimulants of the nervous system, even as convulsants. To reproduce the action of the plant weak and renewed doses must be given. The same alkaloids have been recovered from *S. jacobea*, and even in *S. vulgaris*. In Mexico, *Senecio canicida* is one of the most toxic plants known.

Alopecia of Lambs.—In South Africa, under the name of " Kaalsiekte," there is a very curious malady which attacks lambs and kids on the udder, and which consists of an almost total denuding of the wool and hair, with the production of a crustaceous dermatitis. There arise also diarrhœa, conjunctivitis, keratitis and rhinitis. After having sought the cause of this alopecia, one has recognised that it was due to ingestion by the dams of a plant of the Compositæ family—*Chrysocoma tenuifolia*. There are active principles of this plant which, passing into the milk, cause accidents to the progeny. We sometimes see in our flocks unexplained cases of alopecia very similar to those of South Africa. Enlightened by what we now know, we ought, without doubt, to seek for the causes in some species of Compositæ.

In conclusion of this somewhat incomplete survey, you will gather that the domestic animals are largely surrounded by enemies which are not always microbes or parasites ; that it behoves you in each clinical case which may be puzzling to think of toxic plants ; that the best diagnosis you can often make must include a careful examination of the food elements.

Coccidiosis of the Dog and Cat. By — REINHARDT, *Berliner Tierarzt Woch.*

POSPIECH, in Munich, 1919, found in 1,000 dogs that 31 per cent. were affected with coccidiosis ; in 180 cats, 16.67 per cent. were infested. In 1904, Wasielewski reported that in Berlin young cats frequently died of coccidiosis. Noller, in 1931,

announced that almost all the young dogs at the Tropical Institute of Hamburg were affected with coccidiosis. Of 248 excrement specimens examined by Mayer in Vienna, 4, or 1.6 per cent., gave positive results. In Hungary, Rusvay discovered the presence of oocysts in 250 excrement specimens of the dog. Nieschulz considers coccidiosis is frequent in the dog and cat in Holland. Similar findings have been made in France, Russia and North America. Of 125 dogs examined at the Veterinary Polyclinic of Leipzig, 5.4 per cent. were passing oocysts. Three of these dogs harboured *Isospora rivolta* Grassi, two were carriers of *Eimeria canis* Wenyon and of *Eimeria felina* Nieschulz. Of 75 cats, 14, or 18.6 per cent., had oocysts in the excrement (two cats *Isospora bigemina*, and six cats *Isospora rivolta* Grassi, three cats *I. felis* Wenyon, and three other cats three mixed *Isospora*).

The pathogenic power of Coccidia is the direct cause of destruction of epithelial cells, and this action is increased by predisposing causes such as youth, Carré's disease, catarrhal affections of the intestines, faulty dietary, etc. Coccidiosis most frequently causes signs of gastro-intestinal catarrh, capricious appetite, vomiting, more or less intense diarrhœa, muco-liquid and fœtid odour, finally anæmia and a certain emaciated state. The belly is ballooned and painful on palpation, notably if the animals often have occasion to re-infest themselves. Temperature is slightly raised, and exceptionally there is nervous disturbance. Death sometimes occurs after a short time. Animals with slight infestation and which do not present symptoms are dangerous propagators of the malady, for they eliminate oocysts permanently

Isospora bigemina is observed also in man. Children playing with dogs, carriers of this variety of coccidia, may be contaminated. Several species of *Isospora* of the dog and the cat occur in fur animals, notably when bitches and cats serve as foster mothers to young foxes. Diagnosis on the living animal should be made with the microscope; easy when the oocysts are already formed, it becomes difficult when coccidiosis coexists with Carré's malady.

Treatment and prophylaxis of coccidiosis demands much care. It is impossible to destroy the Coccidia in the epithelial cells of the digestive tube ; it is important to act in the phase of their outside development, to hinder sporulation and to avoid ingestion of oocysts with the food and water or other liquid. Results may be looked for if the affected animals are moved about every two days. Cages they have occupied ought to be thoroughly cleaned with boiling water and a hot solution of 2 per cent. soda or the use of the painter's blow-lamp to destroy all germs. Excrement of cats should be burnt or buried. The affected animals should be isolated and only liberated when frequent and prolonged examination gives a negative result.

Internal treatment comprises the administration of a teaspoonful of an aqueous solution of 1 per cent. methylene blue; of tablets, or an aqueous suspension of charcoal ; of powdered cinchona bark.

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Reproductive Hormone Therapy in Domestic Animals. By G. H. HART and H. H. COLE. *Journ. Amer. Vet. Med. Assoc.*, 1936, 88, pp. 12–22.

REGULARITY of the reproductive functions is of the greatest importance in our food-producing animals, and it is now well established that these functions are for the most part under hormone control. This paper summarises the known functions of the hormones involved in reproduction and gives indications for their use in practical therapeutics. Although these hormones are just passing from the stage of controlled laboratory study to that of field use, valuable results can be obtained with them provided care is exercised in their application and in selection of suitable subjects.

The " gonadtrophic hormones " (synonyms : sex-maturing or gonad-stimulating hormone, prolan A and B, antuitrin, folluitin, etc.) are obtainable in quantity from the anterior hypophysis of many species and from the blood serum of pregnant mares at certain stages of pregnancy. They act on the gonads of both sexes. It is now known that two separate substances are involved, *viz.*, the follicle-stimulating substance and the luteinising principle, the latter depending on the primary action of the former. Cole and Hart found that the injection of active pregnant mare serum into ewes during anœstrum in doses of 100 to 500 rat units resulted in ovulation after three to four days, but without manifestation of heat, this being the normal condition in this species during the change from anœstrum to regularly recurring cycles in the breeding season. A second injection, given about seventeen days later, produced both ovulation and œstrum in a large percentage of cases with subsequent pregnancy. The authors think that this procedure might be valuable when early lambing is desired, or when a uniform lamb crop and a short breeding season would justify the expense. In the sexually inactive ram at the beginning of the breeding season a single injection of double the dose mentioned for the female will produce sexual libido and normal breeding, providing normal healthy sperm are present in the semen. The same substance has also given satisfactory results when used on the stallion, bull and boar. No data are available for the dog, but successful use was made of the substance on male foxes. The conclusion reached by the authors is that, with judgment in selection of cases, the " gonad-stimulating hormone " is indicated in certain cases of impotency in males of any species of mammalia, and in females that fail to show heat.

The action of " œstrone " (synonyms : folliculin, œstrin, female sex hormone theelin, etc.) when used in sufficient dosage, is to stimulate the uterine musculature to most marked rhythmic contractions. For this reason it may have a place in causing the evacuation of uterine contents in cases of pyometra and in increasing uterine muscular control.

" Prolactin," another of the anterior hypophysis hormones, stimulates milk secretion. It has no place in dairying to increase the normal milk flow of lactating cows, but might be used in bitches and females of other species that fail to produce milk following parturition.

N. J. S.

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Does the Right Ovary of the Bovine Function More Frequently than the Left? By C. F. CLARKE, *J. Amer. Vet. Med. Assoc.*, 1936, 88, pp. 52–65.

CONTRARY to a common belief, often mentioned in the literature, that the right ovary of the bovine functions more frequently than the left, the author, from the observations of 704 cases of single pregnancy, presents evidence that either ovary produces ova with approximately equal frequency. Likewise the ova develop into individuals of either sex with equal frequency. Seventy-seven cows were known to have produced male and female offspring from the same ovary. Among 578 completed gestations there were seventeen of twin pregnancy. In seven of these cases, where the calves were of opposite sexes, anastomosis of the blood circulation of the fœtal membranes was observed in four instances, which on subsequent post-mortem revealed a " free-martin " heifer. N. J. S.

Reviews

The Horse—Its Action and Anatomy. By L. D. LUARD. Faber & Faber. Price 15*s*.

THIS book, written by an artist, is intended for all who appreciate the rhythm, movement and anatomy of the horse. It is not a text-book, stating facts which must be committed to memory, but is a limited anatomy (*i.e.*, deals with bones and muscles only) written in such a manner as to make one realise that one is studying a living machine, produced by nature, the perfect mechanic—and not a mass of dead flesh and old bones. The shape of every muscle, tubercle, or process of bone, subserves a definite purpose, that of ensuring the proper working of the machine with the greatest economy of effort. The author describes the interaction of bones and muscles with reference to movement, the correct distribution of weight, and transmission of power. He elaborates from the artist's point of view. This is in some ways a new approach to anatomy, and from this latter aspect one is impressed by two main facts: (1) The ease with which the actions of muscles and bones can be followed, or imagined, in movement; (2) that the animal body is the perfect machine and man in his inventions has merely copied nature. The plates are excellent, the colours enabling one to follow a muscle from beginning to end. Further, the muscles do not look like straight lines attached between two bits of bone for no particular reason, but show up in contour, and one can quite easily picture them in motion. With regard to the text, the author commences with the skeleton, and describes how the bones are so articulated as to provide free movement where necessary without loss of strength. Then follow chapters on action and mechanics, individual bones, the most important superficial muscles, their origins, insertions and actions. Finally, a few words on proportions, movements, rhythm, and art, which apply more directly to the artist than the anatomist, but which, nevertheless, are interesting to both.

" The Poultry World Annual," 1936. Published from Dorset House, Stamford Street, London, S.E.1. Price 1*s*. 6*d*.

THIS annual, of some 340 pages, consisting of short articles by well-known poultry authorities, offers food for thought to those interested in poultry, whether for pleasure or profit. After reading several of the articles—many excellent in themselves—it

appears that the authors are cognisant of the problems which confront them, but that efforts at elucidating these problems are too individualistic. Is it realised that by a combination of efforts and ideas only will ultimate success be theirs? Watanabé, in an excellent article, "Breeding for High Egg Production," points out that for foundation stock it is necessary to "progeny test"; if this advice is followed a good start is made. Haphazard breeding and strict culling will get nowhere. Strict attention must also be paid to nutrition. The impression left by reading the various articles is that there is a lack of true co-ordination of ideas on the inter-relationships of these three important elements of success—proper breeding, culling and feeding. Whilst some writers recommended scientific principles, others belong to the "try-anything-once" group. On reading three different articles, statements are made that birds on a milk diet are "less prone to infestation by internal parasites." . . . Minerals "are of importance also in reducing the susceptibility of fowls to the attacks of intestinal worms." . . . "Vitamin A increases the resistance of growing chicks to infestation by round worms." Each of these statements may by itself be true; but the fundamental truth that all perfectly healthy birds are more resistant to parasites than those that are handicapped by this or that deficiency, is not sufficiently stressed. Does the poultry industry lack help and guidance, particularly with regard to diet and disease? The answer seems to be "yes"; and when it is realised that there is an estimated head of stock of some 80 millions with an annual production turnover of £25 millions, a second question falls to be asked: "Is the veterinary profession fully alive to its responsibilities in this matter?" In spite of the criticisms, the publishers are to be congratulated on this useful book. Most poultry-keepers will read it and appreciate its contents. All veterinary surgeons and veterinary students should read it, for attempts have been made to cover nearly every aspect of poultry husbandry.

W. C. M.

An Inquiry into the Design, Operation and Efficiency of Pasteurising Plants. By A. W. Scott and N. C. Wright. *Hannah Dairy Research Institute Bulletin*, No. 6, pp. 72. 1935.

This bulletin consists of the results of an inquiry undertaken as a sequence to an earlier inquiry in Scotland into the existence of tuberculosis infection in milk.* The earlier report showed that among milks which had been pasteurised according to the accepted standards laid down under the Milk (Special Designations) Order (*i.e.*, at a temperature of 145° to 150° F. for thirty minutes), samples showing living tubercle bacilli could be recovered afterwards. Faculty design and/or operation of the plants concerned was suspected. Some nineteen pasteurising plants in Edinburgh, Glasgow, Dundee and Aberdeen were examined during working conditions by the two investigators; numerous measurements, readings, etc., were taken, and samples of the milk were submitted to bacteriological examination at different stages of the process. Much of the report deals with the more purely technical points in actual processing under the following headings: weighing and receiving the incoming raw milk; initiating milk circulation; filtering or clarifying; heating to pasteurising temperature; holding; cooling and bottling. Among several criticisms made during the earlier stages the following may be noted; Some firms use copper gauze strainers, and it is pointed out that copper, instead of being chemically inert in the presence of milk of a general average pH of about 6.5 and at a temperature of 150° F., imparts a taste described as "oily" to the milk. Some receiving tanks were situated close to the open street and, not being provided with covers, were liable to casual contamina-

* "Tuberculosis Infection in Milk: A Report by the Department of Health for Scotland." —*Med. Res. Counc. Sp. Rept., Ser.* No. 189.

tion with extraneous matters. In the discussion of methods of filtering or clarifying, it is emphasised that some preliminary method of filtering is absolutely essential, and that it should take place at as low a temperature as possible. Opinions vary as to whether cloth filtering through a cotton cloth with a nap, or centrifugal bowl filtering is the better. A table is given to illustrate the inferiority of hand control of the steam supply in comparison with thermostatic control. Temperatures varying between 132° F. and 156° F. were recorded in some plants where steam-kettle heaters were controlled by hand.

In the various types of holder tanks inspected, a common fault was a " dead space " at the bottom near the outlet valve, which not being surrounded by the heated jacket was liable to contain milk which was of a temperature lower than would ensure pasteurising. Thus different samples of milk from these " dead spaces " ranged up to 11° F. below the milk temperature in different plants. The possibility of forward leakage by inlet valves was examined and different types are discussed. Some remarkable discrepancies are reported in the differences between recorded temperatures and the true temperatures taken by N.P.L. standard instruments. Thus, thermometers were found to vary between — 1° F. and + 6.2° F., while thermographs differed by — 6° F. and + 5° F. It is emphasised that there is a great need for constant supervision and checking of heat-recording instruments. The results of registering temperatures in the holder-tanks showed that in four plants examined the temperatures rose above the legal 150° F., and in six were below 145° F. The time of holding was found in certain plants to be below the thirty minutes required, and it is stressed that more care should be given to this aspect of the question by the designers of pasteurising plants. Methods for cooling the pasteurised milk down to below 50° F. were found to be generally satisfactory, but several plants were open to the serious objection that the milk might readily be contaminated by atmospheric contaminants—dust, flies, splashes, and infection from coughing, etc., by operatives. In water used to rinse the cooling surfaces, cultural examination showed that by plate counts, four plants gave results of over 40,000 organisms per ml., and all showed coliform organisms present in 1 ml. (In one case the number of organisms is described as " uncountable.) The degrees of contamination which might exist in the bottles used for the milk receives careful attention. Some washed bottles from all plants were found to contain organisms ; 4.9 per cent. of the bottles containing more than 10,000 organisms per ml.

In the portion of the report devoted to bacteriological control, it is shown that pasteurising can be relied upon to safeguard the customer from pathogenic organisms if the processes are carefully carried out, but that through faulty design or inefficient operation many " pasteurised " milks may contain harmful organisms. Various other factors may contribute to this contamination of pasteurised milk. Especially important are the methods of production. In this connection parts of a quotation are worth giving here : " More careful methods in the production and handling of milk . . . resulted in . . . higher pasteurisation efficiencies, so that counts on the pasteurised milk were markedly decreased."

The summary of the gross reduction in counts between the results of the raw milk as received and those of the milk after bottling shows that this varies between 55.7 per cent. and 99.9 per cent., with the greater number of tests approximating the latter figure. So far as the tuberculosis organism is concerned it is pointed out that, in the earlier report referred to, 33 postive samples were found among 1,092 pasteurised milks examined. The authors of the present report found in efficiently run and highly satisfactory plants no positive results for the *M. tuberculosis* in 340 samples examined, but in poorly operated plants 11 positives among 332 samples. The report ends with a description of the phosphatase test and a short account of the

various materials used in pasteurising plants. It can be recommended to those whose work brings them into contact with milk production or who are interested in the wider question of " pasteurised " *versus* " tubercle-free " raw milk. It is perhaps especially opportune at present, in view of the recent announcement of the changes provided for by the Draft Milk (Special Designations) Order, 1936. W. C. M.

Brucella Infection in Swine: Studies from an Epizootic in Denmark, 1929-1932. By AXEL THOMSEN, V.S. *Acta Path. et Micro. Scand.*, Sup. xxi. (Translated from the Danish by Hans Andersen, M.D.)

DURING the years 1929–32, Axel Thomsen, of the State Veterinary Serum Laboratory, Copenhagen, was occupied chiefly in combating a Brucella epizootic among swine, and he has published an excellent acount of it, prefaced by a general survey of the Brucella group and the diseases caused by these organisms. The three main types of Brucella are :

(1) *Br. melitensis*, which causes Malta fever in man, and infection in goats and sheep.

(2) *Br. abortus*, the cause of contagious abortion in cattle, and also a cause of undulant fever in man.

(3) *Br.* (*abortus*) *suis*, a serious cause of disease in swine in America and also in Denmark. Man may also be infected with this type.

The author gives details of the methods to be employed in determining the type of Brucella isolated, this giving valuable evidence as to the source of infection. The first portion, dealing with the author's own particular studies, concerns Brucella infection in the male, as swine brucellosis is largely a disease of boars and transmitted by boars to sows during copulation. This is in marked contrast to bovine brucellosis, which is encountered mainly in females, the bull playing a very minor rôle. Brucellosis in the boar therefore calls for the greatest attention. Infection in the female may be followed by abortion, but is relatively infrequent as compared with the disease in cattle. A form of infection not previously described was met with and consisted of the presence of numerous well-defined whitish-yellow nodules in the deeper layer of the mucous membrane of the uterus, and called by him " miliary brucellosis." The porcine type of bacillus is evidently pyogenic, for some animals showed abscesses of varying sizes in the different tissues. The Danish epizootic appeared to originate from a large sow sale centre in Ilsö, Viborg. It spread in that area and in Jutland, and apparently was transferred to Zealand with a shipment of infected sows. Altogether 240 herds of swine were infected, but infection was apparently eradicated by the end of December, 1932. Diagnosis may be affected by serological reactions, the author advocating the combined use of the agglutination and complement-fixation tests. The intracutaneous injection of " Abortin " proved a serviceable supplementary test, infected animals showing a local swelling in twenty-four to forty-eight hours. Measures for combating the spread of swine brucellosis consisted of killing off infected animals, and possibly whole herds, as soon as possible. In individual herds infection may be eliminated by frequent serum tests, with slaughter of the infected and adequate disinfection of pens. This latter is important, as urine as well as other excretions may be infective. It is emphasised that there are differences between infectious abortion of cattle and Brucella infection of swine, and that the latter is a special disease of swine with no direct relation to abortion in cattle. It is unlikely that the outbreak described had any connection with bovine abortion. Furthermore, the slight differences exhibited between the American and Danish porcine strains makes it impossible to decide whether the American type has been transferred to Denmark or not. The monograph is an excellent treatise on the subject, and is a very full account of the author's work, with valuable *resumés* of the relevant literature. R. L.

Hereford Veterinary Department: Annual Report for 1934-5.

THIS is the first report of the Chief Veterinary Officer, and deals with the diseases scheduled by the Ministry of Agriculture.

Staff.—One chief veterinary officer, one assistant veterinary officer, one clerk, seven part-time veterinary surgeons.

Animals in the County: Cattle, 122,595; Sheep, 431,363; horses, 16,461; pigs, 40,640.

Diseases.—Six of the scheduled diseases are at present non-existent in the county.

Anthrax.—Sixteen suspected cases were dealt with, all proved negative; the cause of death being generally black-quarter.

Sheep Scab.—One suspected case proved negative. The county has been free from this disease since 1931.

Swine Fever.—Twenty-six outbreaks were confirmed, the movement of pigs from market to market is suspected to be the cause of spreading the disease.

Tuberculosis.—Number of cows in milk slaughtered, 50; cows or heifers slaughtered, 20; other bovines, 7. Number of animals with advanced tuberculosis, 45 (58.4 per cent.); non-advanced tuberculosis, 31 (40.3 per cent.); disease unconfirmed, 1 (1.3 per cent.); tuberculous udders, 6 (7.8 per cent.); tuberculous emaciation, 22 (28.6 per cent.); other tuberculous affections, 48 (62.3 per cent.). Compensation paid, £247; salvage obtained, £36 10*s.*; average value of cattle slaughtered, £7 16*s.*

There is, according to the report, a risk of tuberculous animals being introduced from other counties in which the disease is more prevalent. [This could be prevented by an order that all milking cows entering the county of Hereford should be accompanied by a veterinary certificate as to having been tested for non-reaction.*]

Johne's Disease.—A number of suspected cases of tuberculosis which proved negative were found to be affected with Johne's disease. The spread of this disease is attributed to contamination of drinking pools.

Market Inspection.—As far as possible markets were visited: nine cows, seven fowls and 53 unhealthy pigs were turned out. [It is not stated what was done with them. This is important work which should be extended, it has been urged by the National Federation of Meat Traders for many years.*]

Milk and Dairies (Consolidation) Act, 1915.—No reports from Medical Officers of Health in other areas have been received. One case of cow pox was discovered and the owner warned against selling the milk.

Milk and Dairies Order, 1926.—Although this Order has been in existence for eight years, many farms have not yet been inspected, but the County Council, on February 16th, passed a resolution requiring the inspection of all dairy cattle in the county at least once per annum. One hundred and fifty-three samples of milk were taken, resulting in thirty cows being slaughtered.

Milk (Special Designations) Order, 1923—*Accredited Milk Producers' Scheme.*—The County Council, in 1923, intimated they did not propose to exercise the licensing powers, but they have rescinded the resolution passed in 1923, and the Minister of Health has been asked to transfer to the County Council the licensing powers for the whole of the county.

Meat Inspection.—Twenty-three requests were received to examine meat, principally from the Hereford Rural District Council.

Niuport Sanatorium.—The Shorthorn herd of cows were all tested and no reaction found. One cow purchased was tested and rejected.

Special Investigations and Lectures.—Various investigations were carried out and lectures given to young farmers' classes.

* Reviewer's remarks.

News

PROTECTING THE PUBLIC—UNSOUND MILK DANGER.

THE fifth annual report of the Notts County Veterinary Officer (Mr. H. L. Torrance), which has recently been issued, deals with the steps taken by the County Council to protect the public from the dangers of diseased or unsound milk, with special reference to tuberculosis. The report states that during the year 437 cattle suffering from tuberculosis were dealt with under the Tuberculosis Order of 1925. This increase over the number of 391 tuberculous cattle slaughtered during the previous year is attributed to a new method adopted by the County Council for the detection of cows suffering from tuberculosis in a dangerous form. During previous years the system adopted for the protection of the public from tuberculous milk consisted in the collection of milk samples from the farms and the submission of these samples to an extremely delicate test for the presence of tubercle infection. Where a sample was found to be tuberculous, the farm or farms concerned were visited and the cows examined with the object of detecting the source of infection in the milk. The new system adopted, which became operative on November 1st, 1934, offers an even greater measure of protection to the public, and is more helpful to the farmer, as it aims at the detection of all cows actively spreading tubercle infection, whatever the location of the disease.

CLINICAL EXAMINATION.

The system consists in the clinical examination of all the dairy herds on registered premises twice yearly, supplemented by the collection of herd milk samples immediately after the clinical examination, which are submitted to a searching test for the presence of tubercle infection, the herds concerned in any positive sample being re-examined to ascertain the source of the infection. By this means cows showing any clinical symptoms of tuberculosis are detected and slaughtered forthwith, while those passing tubercle bacilli in the milk but showing no clinical evidence of disease are detected by the milk sampling and subsequent examination of all herds contributing to the tuberculous samples. It is interesting to note from Mr. Torrance's report that Nottinghamshire is the only county in England that has adopted so thorough and comprehensive a system to deal with the problem.—*The Nottingham Guardian.*

DEATH OF TWO VETERINARY OFFICERS.

THE Bureau of Animal Industry has lately suffered great losses by the death of two of its most able officers, Dr. M. Dorset and Dr. A. J. Pistor.

Dr. Dorset's name was known universally as the eminent scientist in charge of the vaccine and serum department of the Bureau. After many years of experiments he and his assistants developed the anti-hog-cholera serum. He was never quite satisfied with the results and continued to seek for a successful preventive against the disease. During recent years experiments had been tried by adding various substances such as phenol, glycerin and formalin. One of the latest was crystal-violet which Dr. Dorset's co-workers now announce, after experimenting on 200 pigs, to give 99 per cent. protection against swine fever. It is impossible to estimate the loss of such a research worker.

Dr. Pistor, who only a year ago was promoted to be chief of the meat inspection service, had been gradually promoted through all the grades and had a practical knowledge of every branch of the work. He died of pulmonary embolism following an operation. Dr. Pistor was one of the most active officers in organising the fine

service so ably conducted in 250 cities, in which employment is found for 2,500 veterinary and other inspectors.

Veterinarians in all parts of the world will sympathise not only with the relatives of these two eminent men, but also with Dr. Mohler and his staff in their irreparable loss.

THE "SCAMPERDALE" BIT.

THE "Scamperdale" bit is the invention of Mr. Sam Marsh, a well-known jobmaster at Redhill, in Surrey, and is one of the most comfortable a horse can have in its mouth, and at the same time its poise and leverage make it very effective. The wider mouthpiece does away with sore lips, and the curved ends which place the bit cheeks far back save any bruising of the inner cheeks against the grinders, which so often happens, unknown to the rider, with close-fitting bit cheeks. It will also be found that the "Scamperdale" bit is very good on a horse that crosses its jaw, as again the wide mouthpiece and movable bar give the comfort the animal is trying to attain. The "Scamperdale" bit, it may be said, has met with great success, and there is nothing in the way of gadgets on it to make it look unsightly. John Peel III, Rose Petal and Cherry Brandy, as well as many other successful show hunters and hacks have been ridden in this bit, and all our leading judges have commented upon its efficiency. The "Scamperdale" should rest on the bars of the mouth midway between the tusk and the grinders with a loose steel curb and lip strap, or, with a light-mouthed horse, a leather curb.

New Preparations

CHANDOL.

THIS is a solid form of the well-known antiseptic Lysol. It will appeal to the busy practitioner. The tablets are packed in air-tight tins, and so are very convenient in carriage, taking up very little room. Solubility is good, and by their use the veterinary surgeon has at his command many gallons of a highly effective antiseptic without the necessity of carrying bulky containers. We can confidently recommend this product to our readers.

APOLOGIA.

REPORT ON THE INTERNATIONAL PHYSIOLOGICAL CONGRESS IN MOSCOW, 1935.
By Dr. YULE BOGUE.

THE account of this Congress, which appeared in the November, 1935, issue of THE VETERINARY JOURNAL, was published under a misunderstanding, as it was a communication sent to the editorial office for private perusal, and not really intended for press publication.—FREDERICK HOBDAY, *Editor*.

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